DOCUMENT RESUME

ED 434 413 EA 030 077

AUTHOR Bottoms, Gene; Webb, L. Dean
TITLE Connecting the Curriculum to "Real Life." Breaking Ranks: Making It Happen.
INSTITUTION National Association of Secondary School Principals, Reston, VA.
PUB DATE 199?-00-00
NOTE 23p.; For others in the series, see EA 030 072, EA 030 073, and EA 030 075.
PUB TYPE Guides - Non-Classroom (055)
EDRS PRICE EDRS Price MF01 Plus Postage. PC Not Available from EDRS.
DESCRIPTORS *Curriculum Design; Curriculum Development; Curriculum Guides; *Educational Change; *Experiential Learning; High School Students; High Schools; Instructional Design; Learning Activities; Student Experience

ABSTRACT

This booklet focuses on strategies for providing curriculum content that is connected to real-life applications of knowledge and skills. It claims that authenticity exists on a continuum and content should not be seen as either completely authentic or as divorced from reality. It outlines the importance of authentic learning experiences, such as verbal experiences, visual experiences, vicarious experiences, simulated experiences, and direct experiences. The text provides tips for connecting the curriculum to real-life skills through project-based learning, which leads to the following results: engaged students learn more, studies take on a futuristic focus, and projects are compatible with the learning styles of students who have had difficulty succeeding in traditional classrooms. The volume also offers some cautions, such as recognizing that projects connected to low-level courses will not result in improved student performance. It offers advice on planning challenging projects and examines the roles of employers, teachers, students, and the principal in planning projects. Various types of projects, such as academic class projects, career research projects, and workplace projects are outlined. The booklet presents a project instructional plan with a project introduction, best instructional strategies, and student reflection. (RJM)

****
* Reproductions supplied by EDRS are the best that can be made *
* from the original document. *
****

NATIONAL ALLIANCE OF HIGH SCHOOLS
BREAKING RANKS: MAKING IT HAPPEN

CONNECTING THE CURRICULUM TO "REAL LIFE"

Gene Bottoms
Director
High Schools That Work,
and Senior Vice President,
Southern Regional Education Board
Atlanta, Ga.

L. Dean Webb
Professor
Division of Educational Leadership
and Policy Studies
Arizona State University, Tempe

NATIONAL ASSOCIATION OF SECONDARY SCHOOL PRINCIPALS
1904 ASSOCIATION DRIVE, RESTON, VIRGINIA 20191-1537
(703) 860-0200 • (800) 253-7746 • FAX (703) 476-5432

Introduction to the Series

The "Making It Happen" series was developed by the National Alliance of High Schools (NAHS) Advisory Council to serve as a resource for high school leaders. The contents are recommended practical strategies, procedures, and ideas to enable school leaders to successfully plan and implement programs that will provide opportunities for students to be adequately prepared for the 21st century.

Topics have been selected for this series by the NAHS Advisory Council, using a priority grid process, from among the range of recommendations, themes, and programs discussed in *Breaking Ranks: Changing an American Institution.*

The "how-to" strategies are designed to provide clear and concise procedures for successful implementation and outcomes in your school improvement plan. The strategies are based on research and also "best practices" of current schools.

The Council welcomes input regarding additional programs that support the recommendations and themes cited in *Breaking Ranks.*

L. Dean Webb is the editor for the "Making It Happen" series.

Copyright 1998

National Association of Secondary School Principals

Executive Director: Thomas F. Koerner

Associate Executive Director, Director of High School Services
and the National Alliance of High Schools: John A. Lammel

Director of Communications: Robert Mahaffey

Associate Director, National School Alliances: Patricia George

Editor: Robert N. Farrace

National Association of Secondary School Principals
1904 Association Drive
Reston, VA 20191–1537
(703) 860-0200
(800) 253-7746
nassp@nassp.org

Connecting the Curriculum to "Real Life"

In too many high schools today, students are being taught a curriculum that does not provide them the opportunity to learn the skills they need to succeed in today's global society. Far too often students do not recognize the connection between events in their everyday lives and what the schools are attempting to teach them, nor can they see the links between what they already know and what they are being taught.

Recognizing the seriousness of this situation, NASSP, in its 1996 report, *Breaking Ranks: Changing an American Institution*, recommended that "the content of the curriculum, where practical, will connect itself to real-life applications of knowledge and skills to help students link their education to the future" (p. 11).

To implement this recommendation, the report acknowledges that high schools must "do more to present the curriculum in the context of experiences that compel students to apply knowledge in situations that approximate those in which they will use knowledge in real life, 'authentic learning,' if you will," and that "part of teaching a subject well should be understood to include imparting the ability to use knowledge and to tie it to prior learning" (NASSP, 1996, p. 15).

The report disavows this recommendation as not just another call for "relevance," or a suggestion that material has a legitimate place in the curriculum only if it has an immediate and apparent connection to the day-to-day life of the student. It does, however, reflect acceptance of the conclusion of the American Psychological Association's Task Force on Psychology in Education that "higher-order thinking skills and creativity are elicited when students have opportunities to work on projects that are at a level of complexity and duration that is comparable to real-world issues and problems," to engage in what the Task Force calls "motivation-enhancing learning tasks" (NASSP, 1996, p. 15).

The recommendation is also a reflection of the conviction that showing students how to apply what they know accents the practicality of knowledge and heightens students' interest in the content. As the German philosopher Heidegger observed, "Merely to absorb facts is of only slight value in the present, and usually of even less value in the future."

Compatibility with Current Views of Learning

The importance of relevance and context is supported by the recent research on brain-compatible learning. Neurobiological research has shown that relevance is a biological function that is a result of an existing neural site making a connection with a nearby site. When relevant content is presented, the connection is made; if the content is irrelevant, the connection will probably not be made. The greater the number of links and associations the brain makes, determined in large part by the relevancy of the content, "the more neural territories are involved and the more firmly the information is woven in neurologically" (Jensen, 1998, p. 92). In the process of patterning, groups of neurons "seem to be able to recognize and respond to meaningful learning" (Jensen, 1998, p. 95).

Without question, a curriculum such as that recommended by *Breaking Ranks*—a curriculum that focuses on relevance and a real-life context for learning—takes advantage of what we know about brain-compatible learning to help students make meaningful patterns and reinforce context.

Authentic and Appropriate Content

Advocating that the curriculum be connected to real-life applications of knowledge and skills does not suggest that utilitarianism should dictate the curriculum or that the curriculum be without academic rigor. "To the contrary, teachers must diligently invest some of their time in the direct teaching of abstract principles and basic concepts as a necessary prelude to the application of knowledge" (NASSP, 1996, p. 16). Ultimately, a curriculum that is connected to real-life applications of knowledge and skills is characterized by both authenticity and appropriateness.

Using authentic learning strategies that are not linked to learning important content is meaningless. "Researchers have found that when the appropriateness of content is not attended to, comprehension is impeded, strategies cannot be used effectively, learning is fragmented, and transfer of content knowledge to learning situations is impaired . . . Authentic content . . . goes to the heart of a discipline and material that allows for personal applications of ideas that go beyond school-related activities" (Valencia and Peters, 1991, p. 500).

Curriculum content that is authentic and appropriate reflects the following:

1. The important themes and ideas of the discipline—essential as guides to the integration of facts, concepts, generalizations, and theories
2. Alignment with the subject area goals of the curriculum in the district
3. A grounding in real-world experiences and application both inside and outside the school
4. Content appropriate to the developmental stage of the learner
5. Content that encourages students to engage in higher-order thinking, i.e., that encourages questions requiring more than a reproduction of knowledge (Valencia and Peters, 1991, p. 501).

To recommend that schools do more to focus on authenticity does not mean they must abandon their substantive focus. Thus, while Grant Wiggins argues that students need more opportunities for "doing the subject," he also argues that what counts in school is the quality of the product of the learning activity, just as it is what counts in out-of-school performance tasks (Schneider, 1994).

Providing curriculum content that is connected, as far as practical, to real-life applications of knowledge and skills does not mean that all applications will be creative or fun. The aim of authentic learning is to engage students in situations that resemble real life. It would be a grave mistake, then, to shield them from the fact that some of the work of real life, such as balancing a checkbook, is mundane, yet absolutely necessary. An important goal of authentic learning is also learning the self-discipline to face these kinds of chores (Cronin, 1993).

The concept of authenticity exists on a continuum. Content should not be seen as either completely authentic or divorced from reality (Cronin, 1993). For example, teaching high school students to speak Spanish by requiring them to use the language in classroom conversation is more authentic than instructing them to recite stock Spanish sentences from a text. Similarly, learning Spanish by using the language during an internship in Spain is more authentic than using it in classroom conversation. However, the fact that learning Spanish by living with native speakers is the most effective way to learn the language does not make using Spanish in classroom conversation a poor alternative (Cronin, 1993).

Authentic Learning Experiences

No one type of authentic learning activity is the most effective. "Only through a variety of activities can you expect students to make new connections, integrate their learning, and find the ways and means to apply what they have learned to new situations" (Maksimowicz, 1993, p. 2). Newmann and Wehlage (1993) differentiate authentic learning experiences or activities from those found in the traditional classroom based on the extent to which they promote higher order thinking, depth of knowledge, connection to the world beyond the classroom, substantive conversation, and social support for student achievement.

Learning experiences have been described along a continuum of abstract to concrete and visually depicted by several authors as a Learning Experiences Ladder such as that depicted in Figure 1. Kellough (1997) describes the various experiences on the ladder as follows:

VERBAL EXPERIENCES: Teacher talk, written words; engaging only one sense; using the most abstract symbolization; students physically inactive

VISUAL EXPERIENCES: Still pictures, diagrams, charts; engaging only one sense; typically symbolic; students physically inactive

VICARIOUS EXPERIENCES: Laser videodisk programs; computer programs; video programs; engaging more than one sense; learner indirectly "doing"; may be some limited physical activity

SIMULATED EXPERIENCES: Role playing; experimenting; simulations; mock-up; models; all or nearly all senses engaged; activity often integrating disciplines; closest to the real thing

DIRECT EXPERIENCES: Learner actively doing what is being learned; true inquiry; all senses engaged; usually integrates disciplines; the real thing (p. 300).

Authentic learning experiences fall within the bottom three stages on the ladder. These experiences tend to be interdisciplinary and also tend to employ the cooperative learning and inquiry learning instructional strategies—strategies that involve students making more decisions about their own learning and that rely heavily on intrinsic student motivation. These strategies also "facilitate positive learning and acquisition of conceptual knowledge as well as helping build self-esteem" (Kellough, 1997, p. 298).

Figure 1: The Learning Experiences Ladder

Adapted from: Kellough, R. D. (1997). *A Resource Guide for Teaching* (K–12, p. 300). Upper Saddle River, NJ: Merrill.

BEST COPY AVAILABLE

Connecting the Curriculum To Real-Life Skills Through Project-Based Learning

Perhaps some of the best examples of schools that are engaged in the type of curriculum redesign envisioned by *Breaking Ranks* can be found among the schools involved in the Southern Regional Education Board's High Schools That Work (HSTW) program. A major goal of the HSTW program is the integration of the essential content of traditional college preparatory studies—mathematics, science, and language arts—with vocational studies by creating conditions that support school leaders and teachers, resulting in an environment that encourages student success.

A growing number of HSTW schools help students connect key academic knowledge and skills to practical uses in the context of careers or community concerns through project-based learning. The major educational benefits of project-based learning include:

1. Engaging students in learning leads to deeper understanding.

When students are asked to use knowledge they already have to develop new knowledge, create a product, or solve a realistic problem, they engage in higher-order thinking that allows them to go beyond rote memorization. As they learn to think critically and solve problems, they see how academic concepts apply to the solution of problems. They engage in the optimum type of concrete learning experience described on the Learning Experiences Ladder.

The types of authentic experiences that project-based learning offers meet the needs of the broadest spectrum of students, whatever their learning styles. These experiences lead to deeper understanding of subject matter, involve students in making decisions about their own learning, and are strong student motivators. Teachers at many HSTW sites report that students arrive early, stay after school, and willingly do homework when engaged in stimulating student projects. Attendance problems are also reduced and students demonstrate an enthusiasm for learning to a degree as never before.

2. Studies take on a futuristic focus.

The perennial question, "Why do I need to know this?" is answered. Since students can make connections between what they are learning and how they can use that knowledge in adulthood, they do not resist learning the principles and facts necessary to solve the posed problems. By participating in projects, students have the opportunity to experiment with realistic applications of activities that might be utilized in a variety of career fields. They discover new personal strengths and see how future roles require a combination of academic, technical, intellectual, and personal skills for success.

3. Projects are compatible with the learning styles of students who have had difficulty succeeding in traditional classrooms.

Well-prepared lecture, drill, and memorization of essential facts remain an important part of instruction in high school classrooms; however, most students have a deeper understanding of content, retain information longer, and learn better when traditional instructional approaches are integrated with project-based learning.

When students apply academic knowledge and skills they learned in the context of real-world tasks and problems, they perform better on standardized student achievement tests and are more likely to pursue and succeed in post-secondary education. Even the top-achieving students benefit when they begin to see more connections between abstract knowledge and their future adult roles.

A Word of Warning

Like any instructional strategy, project-based learning has its pitfalls if it is not imple-

mented correctly. Principals who want to encourage the use of this learning approach need to be fully aware of the hazards and take steps to ensure the school structure, curriculum requirements, and student expectations create a climate in which quality learning can occur. Project-based learning cannot "fix" a school that is not committed to excellence. Principals and teachers must address some key considerations before moving ahead with project-based learning:

1. Projects connected to low-level courses will not result in improved student performance.

Setting high standards for what students are expected to learn is the first key to improved achievement. Schools that do not require students to complete a rigorous curriculum will not achieve success no matter how innovative their instructional strategies. In far too many high schools, by ninth grade, large numbers of students have been deemed incapable of mastering subjects such as algebra or chemistry or English with stringent reading and writing requirements and have been relegated to watered-down language arts, mathematics, and science courses, and to lower expectations in the courses they do take. They are allowed to "get by" in courses that require them to do less of the things they have not been successful doing in the past.

High Schools That Work encourages high schools to require all students to complete a solid academic core and an academic or technical concentration. (The recommended course of study is presented in Table 1). And, the results of the 1996 HSTW assessment suggest that the majority of students can succeed in college-prep level academic courses and make significant achievement gains when they have exposure to a quality curriculum.

2. Low-level projects are not beneficial.

Educators may become enamored of the strong student appeal of projects and may lose sight of the rigorous criteria a project must meet. Many project ideas may be fun for students but will do little to advance their learning. Projects that do not directly address one or more of the critical goals for a course have no place in the curriculum.

The principal is key to creating the proper school environment in which learning through real-world projects can flourish. Without attention to these concerns, projects will make little difference in whether students' knowledge and

Table 1

The High Schools That Work Recommended Curriculum

English	At least four credits with content and standards of performance equivalent to college preparatory English
Mathematics	At least three credits, with two credits from courses with content and standards of performance equivalent to college preparatory mathematics
Science	At least three credits, with two credits from courses with content and standards of performance equivalent to college preparatory science
Social Studies	At least three credits with content and standards of performance equivalent to college preparatory social studies
Concentration	At least four related credits in a career or academic major and two additional credits in a related academic or technical field, including one credit in learning technologies such as word processing and data base software, the Internet, or E-mail

skills advance to a level that makes them ready for success beyond the high school doors.

3. Good courses must have goals that answer key questions.

To make sure courses are challenging enough to meet the test of rigor needed to help students advance, educators should answer questions about the course, such as: What specific technical and academic information is the student expected to know? What interpretations, estimations, or predictions will students need to make about the content? What analyses are students expected to make using the knowledge they gain? These issues must be addressed before work can begin on planning course objectives.

Planning Challenging Projects

Projects are a means to an end, not an end in themselves. They are a way for students to acquire and apply knowledge to solve real problems, to produce real products, and to perform real tasks. Selecting and developing challenging projects requires careful attention to course goals. The principal must insist that authentic projects be planned with the expectation of advancing students' academic, technical, intellectual, and personal development.

Projects allow students to plan, collect and evaluate information, analyze situations, and develop solutions to challenging problems. Although one of the values of projects is the flexibility they provide students to manage their own learning, they require careful thought and planning on the part of the teacher.

A project can take many forms. It can involve creating a product, developing or implementing a plan to meet a need in a local business, operating a business in the school or community, or studying a critical issue and preparing a report on the findings. The problem-solving aspect of a project is crucial. Students need to learn that employees who solve problems and complete assigned projects are the ones who advance in careers. A good project generally requires students to complete a series of steps and to make judgments and decisions when unexpected events occur.

There are a number of criteria for determining if a project idea will be a good match in a course. (See Table 2 for a summary.) It's important to note, however, that teachers should not work in isolation to select course projects. Four important partners in identifying and planning projects are employers, other teachers, students, and the principal.

Table 2

Criteria for Selecting Course Projects

Good projects:

- Are large enough to allow students to acquire and apply major technical, academic and personal skills needed to achieve course goals
- Result in work that would be done in a real workplace
- Help students understand and experience the major technology used in the field
- Challenge students intellectually
- Present problems and open-ended situations
- Require students to organize information, consider alternatives, and use higher-order thinking skills
- Require students to apply academic skills
- Require students to learn from the teacher, other teachers, and outside experts
- Involve both individual effort and teamwork
- Require students to work with authentic tools and materials that might be used in a career
- Have clearly defined quality standards that students can use to evaluate their work and take corrective action

The Role of Employers In Planning Projects

Employers are an essential source of ideas, since most projects are intended to offer students opportunities to address problems and issues they will encounter in careers. They can provide guidance for such projects as developing a business plan, designing an office for a company, presenting alternatives for a community park, or developing products that might be used in the workplace. Employers are aware of needs in the business community and may be able to suggest projects that will help an employer address an actual problem.

Employers may talk with students in class about issues and procedures that will be important as they work on a project. They may provide opportunities for students to observe employees performing some of the same activities that the student's project addresses and can serve on panels that listen to project presentations and provide students feedback on the quality of their work and how it might be judged in the workplace.

The Role of Other Teachers In Planning Projects

Some of the best projects involve more than one class, more than one teacher. These interdisciplinary efforts offer an excellent way to help students understand the connections and interrelationships involved in most major workplace tasks.

Even when a project does not involve several classes, the best assignments require students to use a range of knowledge and skills. This calls for support from teachers outside the class in which the project is being conducted. The teacher whose class is conducting the project should touch base with other teachers to ensure that students have already learned any essential competencies they will need to use to complete projects.

Sometimes, more than one teacher will grade students' projects. Most high school schedules do not allocate teacher planning time based on which teachers might benefit by having a common planning period. However, some schools are beginning to address this issue by forming smaller clusters or schools within schools, with both academic and career/technical teachers assigned to each cluster, and building time for cluster planning into the schedule. In other schools, teachers who want to work together are given the opportunity to request the same planning period.

The Role of the Principal In Planning Projects

Principals should encourage teachers to work together in project planning and do whatever possible to make that a reality. Some of the strategies principals can use to promote teacher cooperation in implementing project-based learning include:

- Give teachers time to visit the classrooms of colleagues who are already involved in projects. This will inspire them to determine how various courses interconnect.
- Encourage teachers who are planning projects to involve other teachers so they can work together to help students develop the full range of competencies needed to complete the project.
- Arrange for teachers to visit work sites where students are engaged in work-based learning experiences to observe how academic competencies are used in the workplace and to develop work-site project ideas that will require students to apply school-based knowledge and skills.
- Involve employers in planning engaging projects and ongoing consultation to students as they work on the projects.

The Role of Students in Planning Projects

Students should also be involved in selecting their project topics. The amount of flexibility and decision-making authority students exercise will grow with each project they complete. At the beginning of a course or early in their high school years, students may be given very specific project assignments planned by their teachers. As they grow in knowledge and skills, they may have a stronger voice in selecting project topics and in determining how they will carry out the assignment.

For example, many schools that have adopted Senior Projects give students a great deal of freedom to select topics, plan their work, do the necessary research, line up a panel of experts to evaluate their project presentation, and develop creative reports and presentations. Students at HSTW sites say they are more motivated and do higher-quality work when they are involved in planning projects. This experience helps students learn how to think logically, solve problems, and apply academic and technical skills.

Giving students a voice in project selection and planning does not mean that "anything goes." Projects must meet the high-quality standards determined by the teacher and discussed thoroughly with students at the outset of the project. Projects must also clearly address one or more course goals. When students know in advance what is expected and why the projects are important to them, they will do their best work.

Types of Projects

Many project ideas will be generated as teachers begin to work with employers and other teachers. The principal can help teachers consider options by reviewing some of the approaches that have worked well in many schools. These can be categorized into five types: academic class projects, career/technical class projects, workplace projects, across-the-curriculum interdisciplinary projects, and senior projects.

Although across-the-curriculum interdisciplinary projects are discussed separately here, note that virtually all projects are interdisciplinary in nature—involving, at a minimum, reading, writing, and mathematics skills, and another subject such as history, art, government, science, computer technology, or business. Project considerations in each of the five areas are discussed in the following sections.

Academic Class Projects

Many academic teachers admit they really don't know in a practical sense how the concepts they teach are used in the workplace. Therefore, before academic teachers can develop appropriate projects, they should do some research. One of the best and most readily available sources of information are the career/technical teachers.

A mathematics teacher, whose students consistently achieve high scores on the mathematics portion of the HSTW assessment, reports that she learned how to use projects to enliven and enrich her algebra and geometry classes by talking with every career/technical teacher in her high school. From these interviews, she was able to identify a wide range of simple and complex projects. The results were astounding. "I saw kids I had written off doing math I never thought they could do," she says. Her students run a credit card business jointly with a business education class. They learn how to plot points by visiting a lab to see how a robotics arm works. "I always show students a real-life application of everything. If I can't find out a way a concept can be used, I question whether we should be teaching it," she adds.

This teacher's extensive use of career/technical labs is an approach all academic teachers should consider. By visiting these labs, teachers can help students understand how concepts they are learning are applied. At the same time, they establish connections between key academic concepts and career/technical applications. Academic teachers should see these labs as an extension of their own classrooms.

Other project ideas are inspired by teachers' visits to community businesses to observe how workers use various academic disciplines in their work. Academic teachers who participate in job shadowing experiences come back with scores of ideas for projects relating academic concepts to career issues and problems.

Career Research Projects

One way to help students begin making connections between their high school studies and a future career is a career research project. A team of teachers can design such a project for all ninth grade students as part of the English class or as part of a required ninth-grade career exploration or high school readiness course. Since project work is still new to most ninth-grade students, the projects tend to be less open-ended than projects students will pursue later.

At Sussex Technical High School in Georgetown, Del., which was recognized by the U.S. Department of Education in 1996 as a New American High School, all ninth graders develop a comprehensive career report on four areas of interest. This requirement is designed to reinforce academic skills of all incoming freshmen. The project requires them to do research, write a brief autobiography, and arrange information according to a prescribed format, which they do in their computer skills class. The project also helps students make decisions about the career major they will explore during the last three years of high school.

Career/Technical Class Projects

Finding projects that enable students to apply concepts they learn in career/technical classes does not seem too difficult, since the career/technical course content by its very nature lends itself to many approaches. Yet, projects that engage students in career/technical activities and require them to use academic skills necessitate that career/technical teachers change the way they teach.

Teachers in the mechanical engineering program at Brooklyn Technical High School in New York proved that less is more when they revamped their curriculum to focus on a series of lab-type activities and problem-solving projects posed as design briefs. The new approach allows students to spend a great deal of time working in teams to design and construct projects and has made it possible for the instructors to truly integrate the curriculum. Design briefs are fairly open-ended. "We want the students to see that most problems have a wide variety of possible solutions, which will stimulate them to take more risks," explains one instructor.

Teachers also work in teams, but in a very different way than before. They move from team to team, helping students solve the endless design problems. They don't give answers; instead, they try to model the brainstorming process for students. They believe this mentoring support strengthens problem-solving skills while increasing students' confidence in their ability to overcome obstacles.

This revised approach to teaching has caused a resurgence of interest in the program, which had been suffering from lagging enrollments. More girls are enrolling. Students can be found in the classroom as early as 7:00 a.m. and as late as 6:00 p.m. Many students choosing the course are not interested in pursuing engineering as a career but, in the words of the instructor, "all of them have come to see technology in

general and engineering in particular as exciting, enjoyable, and on the cutting edge of learning."

Workplace Projects

Although work-based learning is not new in American high schools, these experiences in the past have been limited to a small group of students who were considered vocational students. With the growing requirement in high schools that students have an academic or career concentration, work-based learning is becoming more widespread. Student learning is enhanced when projects are integrated with these experiences. Assigning students a project helps them see the connections between what they learn in school and what they do on their jobs.

Two major types of work-based learning are offered in most high schools: job shadowing and internships. What follows are some suggestions for using projects to help students make the most of both types.

Job Shadowing

Job shadowing consists of a visit to a specific business or industry to observe the business in action. Students identify one or more areas of interest and are matched with employers accordingly. Students can follow one or more employees as they do their job. The best experiences expose students to all aspects of the company's operations. Although job shadowing is frequently included as part of the curriculum in career/technical classes, it can be equally effective in academic classes. Students can visit a business or industry to see how English, mathematics, or science are used on the job or to explore career options that can evolve from an aptitude in one of these areas. Job shadowing has become so popular that many schools try to offer job shadowing for all students.

A team of teachers can develop guidelines to ensure the job shadowing experience benefits all students. Teachers should help students learn how to interview the employees they will visit. The teacher can guide the discussion, making sure that as they develop questions, students explore the full range of technical, academic, intellectual and personal skills that workers need to do their jobs.

The job shadowing project does not end with the actual visit. Students may prepare written reports and make oral presentations about their experiences. These activities help reinforce what students learn, and other class members benefit by hearing about a wide range of businesses and industries. Students can answer specific questions about their experiences, but they should also be free to add other insights they gain during their visits.

Schools interested in launching a schoolwide job shadowing initiative might want to obtain information from America's Promise about a nationwide job shadowing event held each year on Groundhog Day, February 2. This program, which was pioneered by Bell South, is jointly sponsored by five national organizations. In February 1998, 150,000 students participated. (A guide for educators can be downloaded from www.bellsouth.com. Click on "Community and School Involvement.")

Internship Projects

Internships pair students with work-site mentors who guide the students throughout the internship, for which students earn a half to a full credit. Schools that require students to complete a career or academic concentration make an internship experience an optional part of the program. Internships usually last four to eight weeks during the summer between the 11th and 12th grades. A project can add a new dimension

to the experience because it reinforces the benefits of the academic and technical skills students develop in school. As part of the project, the student can develop a product that would benefit the company or write a report about an issue that is important to the company.

Throughout the internship, students record their experiences in a journal. Students can also use the journal to provide answers to a series of essential questions about the employer that have been pre-determined by the student and the teacher. At the end of the internship, students demonstrate their projects at a special event to which employers, school leaders, and parents are invited. This type of exposure and recognition is vital to motivating and encouraging students to work hard. (More information about how to plan and conduct summer internships that include projects is provided in *Planning and Conducting Student Summer Internship Experiences*, available from the Southern Regional Education Board, 592 10th Street, NW, Atlanta, GA 30318; 404-875-9211; www.sreb.org.)

Across-the-Curriculum Interdisciplinary Projects

Some of the most exciting projects involve teachers from a number of subject areas. These projects require high levels of teamwork and advance planning, but they are well worth the effort. Across-the-curriculum projects allow students to see how knowledge, understanding, and skills are connected in the workplace.

The principal plays a key role in the success of across-the-curriculum efforts. When principals demonstrate enthusiasm for these types of projects and provide teachers with the time and resources they need to launch a project of this magnitude, teachers feel free to be creative in planning projects that raise students' learning experiences to new dimensions.

The experiences of schools that have successfully implemented across-the-curriculum projects suggest the following:

1. Start early.

For complex projects, teachers may need to spend several staff development days during the summer to make plans.

2. Be clear about the alignment of academic and technical content.

A week spent in the summer completing a curriculum mapping guide will pay dividends throughout the year. The guide should show what concepts each teacher in the school plans to teach month by month for the entire school year. By laying out the entire curriculum in this fashion, teachers can see overlap in what is taught from class to class and can identify ways content can be rearranged to ensure, for example, that students learn a concept in mathematics at or before the time they will need to use that information in an electronics class. An obvious outgrowth of this effort is that teachers begin to see clearly how they might work together on a project that will further the goals for several classes.

3. Schedule time for students from different classes to work together on the project.

So much of the success of across-the-curriculum projects is a matter of scheduling. Ideally, all classes involved in a project should meet at the same time, but this is not always possible. Some schools use activity periods for this purpose. However, educators at schools that are very involved in projects have found that students willingly come to school early or stay late and use weekend time to work on an interesting project.

4. End the project with an event.

A project should culminate in an event such as an exhibition, a community celebration, a dinner, or a presentation to the city council. Students benefit most from their participation

in a project when they have the chance to demonstrate what they have learned and accomplished. Invite the largest possible audience, including employers, community leaders, school officials, teachers, students, and parents. This day, when students can shine, will be the high point of their school year.

Examples of some across-the-curriculum projects that have been implemented successfully by schools within the High Schools That Work network include:

• *Springfield on Track*

Classes in English, mathematics, science, history, and six career/technical areas at Roger L. Putnam Vocational Technical High School in Springfield, Mass., teamed up to make a significant contribution to their community's celebration of the History of Transportation in Springfield. Working in collaboration with the Connecticut Valley Historical Museum, students recreated Springfield's Trolley Barn and a miniature trolley on the town Quadrangle Green. They also operated a concession offering turn-of-the-century food and beverages prepared by the students, served as junior docents for tours of the exhibit, conducted an extensive promotional campaign for the event, and printed posters, brochures, programs, and menus. Academic classes provided related instruction for various phases of the project.

• *Prize-Winning Electric Car*

Nothing gets the adrenaline up and challenges students to peak performance like a car race. Students at Waialua High School in Hawaii won the state's Electron Marathon, in which high school students race electric cars and make presentations on the construction and design of their entries. The students' oral presentations about the project demonstrated science, mathematics, electronics, and communication skills. They also won the portfolio competition, which included students' performance on tests, teacher observations during the project, and student descriptions of the project, the refinements they made along the way, and changes they saw in themselves since working on the project.

• *Aquaculture Center*

Science achievement scores soared for students at Philip Barbour High School in Philippi, W.Va., when they began to get more hands-on learning of science principles in the new aquaculture center located next door to the school at the Barbour County Vocational Center. Career/technical, mathematics, and science students work side by side in the center daily, studying areas such as filtration, circulation, evaporation, and water chemistry. Students at the center get real-life experience as they are raising and harvesting the African game fish, tilapia.

Senior Projects

A senior project is an ideal way for students to demonstrate what they have learned during their high school years. It takes the usual senior year research paper requirement to a new level of difficulty. Senior projects are growing in popularity as schools see their advantages in making the last year of high school one that stretches students rather than allowing them to coast. In many schools the senior project began as an option for extra credit, but it is increasingly becoming a requirement for all seniors.

The senior project is usually coordinated by English department faculty members, but typically involves one or more teachers outside the department, depending upon the project topic selected by the student. Most projects consist of a research paper, development of a product related to the project topic, and presentation of the project before a panel of experts. Students are given great leeway to make decisions and choices about their projects within a framework

of criteria set by the school. Senior project guidelines should require students to choose a project topic that will involve application of knowledge from several fields of study. This approach proves to be very educational. One senior put it this way: "I have learned what it means to be free, and I have learned that with freedom comes great responsibility."

Project topics can be as varied as students themselves. Some recent topics chosen by students at HSTW sites include electric guitars, Special Olympics, forest fires, franchise restaurants, use of computers and marketing in a travel agency, differences in car production in Japan and America, a customer service plan for a local business, and Web page development. Students may produce an actual physical product, a business plan, or an original musical composition; or their end result might entail helping coordinate a special event.

Students are responsible for assembling their own review panels based on established guidelines. Due to the nature of some of the projects, presentations at times may be made off campus. One student at Sussex Tech who was pursuing a health major, selected teen pregnancy as her topic. She invited Delaware Governor Thomas Carper, who included this issue as one of his state initiatives, to be one of her panel members—an invitation he accepted.

Schools that adopt the senior project go to great effort to make the project succeed by developing extensive guides that provide detailed information on each project component and outline roles of students, English teachers, librarians, other teachers, and the panel of experts. Most schools have a senior project committee that establishes policies, arbitrates disputes, sets schedules, and helps prepare panel participants. (Additional information about senior projects is provided in *Teaching for Understanding Through Integration of Academic and Technical Education*, available from the Southern Regional Education Board, 592 10th Street NW, Atlanta, GA 30318, 404-875-9211. In addition, NAHS members should check the Alliance website network directory at www.nassp.org/aln.frm.htm for a list of schools that include senior projects in their programming).

The Project Instructional Plan

Once teachers have selected projects for a course, they must develop a comprehensive instructional plan. As previously noted, a great deal of thought must be given to how the teacher will interact with students throughout the project because the teacher's role is quite different from what it is in traditional methods of instruction.

Project Outline

Teachers should develop an outline, a succinct one or two-page explanation of the project's essential elements and student expectations, for each project. The outline is significant because it communicates critical information to students and parents. Although project outlines can take a number of forms depending on the type of project and the teachers' creativity, the outline should contain the following components:

- *Situation or Problem.* A brief two or three-sentence description of the problem or issue students will explore.
- *Project Description or Purpose.* A concise explanation of what the project's end product is expected to be—a product the student constructs, a process, a research report, or a combination of all three.
- *Performance Specifications.* A list of criteria or quality standards that the project must meet.

- *Rules.* Guidelines for carrying out the project.
- *Assessment.* An explanation of how students' performance will be evaluated.

The project outline is a way to involve students from the beginning of the process. It is also the teacher's starting point for helping students plan the project, determine how they will complete it, list the questions for which they will need answers, and identify potential sources of information. Student ownership of a project is critical for success. The more involved students are in thinking through the necessary steps to complete the project, the more productive they will be and the more they will learn and retain.

Project Introduction

How the teacher introduces a project in large part determines how excited students are about what they are being asked to do. The teacher must create a vision of what the final product can be without prescribing its exact nature. Projects are best introduced with a demonstration, such as a film about the topic, displays of projects that other students have completed, or a visit to a work site where employees are using a product or applying a process students will use. If students are to develop a business plan, the teacher may want to share examples of plans from actual businesses.

Students should have the time to provide their own input about the nature of the project. Teachers may want to start by asking students to write a brief essay discussing what they already know about the project topic. Making sure students understand the level of quality that will be expected of them is a major part of the project introduction. Students should understand the project standards well enough that they will be able to determine whether their own work meets the standards. Teachers should provide as many models as possible to demonstrate the level of quality that will be expected to reinforce the expectations.

Organizing the Classroom For Project Work

Projects can be done individually or in teams. Students should experience both approaches. For many students, this may be their first experience working as part of a team; therefore, the teacher should help students understand both their individual responsibilities and their responsibilities as team members.

In one class, the majority of work is done in teams. First, students work individually on proposed solutions to the project challenge or problem. The team then comes together to consider each proposed solution and chooses the solution it will use. The teacher then reviews the solution to make sure it meets project guidelines. Once the solution is approved, the teacher instructs students in the required competencies they will need as they progress.

Each student must understand the entire process that the team goes through to complete the project. Therefore, students learn how to perform quality work as individuals and how to contribute to a team effort.

Best Instructional Strategies

Lecture is not eliminated in project-based instruction, but it is reduced. As they plan project-centered courses, teachers must give careful thought as to when to use lecture, when to use technology, and how to help students develop problem-solving skills. In the latter instance, teachers use a questioning process to help students learn how to think through problems. Rather than providing "the answer" to a question, a teacher might ask students a question that leads them to consider additional options. The teacher might also suggest resources that will help students find information they may need to progress.

The use of outside resources is extremely important in project-based learning. Students should have the opportunity to draw on the

expertise of community businesses, the library, other teachers, the Internet, books, software, and videos.

Student Reflection

Journals can help students record their progress on projects and keep teachers informed about what students are doing. Students should be expected to write in their journals at least weekly, reporting what they have done on the project to date, questions they may have, and what their next steps will be. Three questions students might be required to answer in their journals are: What did I learn this week? In what areas do I need the teacher's help? What can I do to increase my learning?

One teacher tells his students, "If it isn't written down, it didn't happen!" This is his way of helping students learn the importance of documentation. If a dispute arises among team members about an individual's contribution to the team effort or about what specific actions have been taken, the journal is the instructor's reference for resolving the conflict. The journal becomes a part of the student's portfolio discussed below.

Helping Students Stay on Course

Many teachers new to project work worry that if they give students extensive freedom, the students may wander off course or waste time. Teachers who use projects successfully utilize a number of procedures that ensure this does not happen. In addition to reviewing journals weekly to look for areas in which students need help, teachers can require periodic oral progress reports. The questions teachers ask as they move from team to team also elicit important feedback on trouble spots. If a teacher discovers an area that is giving many students difficulty, this may signal the need for a classwide lecture or demonstration to address the issue.

Showcasing Accomplishments

The importance of having students present their final project before a panel of experts and an audience from inside and outside the school cannot be over-emphasized. This presentation is a powerful student motivator because students want to do their best before an audience. The experience helps students develop important presentation skills they will use throughout life. It is also an important evaluation measure. Students' final grade on their project work will depend heavily on the evaluation they get from the panel of experts. Finally, it is a "feel good" activity that makes everyone involved proud of the students' achievements.

Teachers help students prepare for this event throughout the project, giving them several opportunities to practice presentation skills, evaluating their performances, and helping them learn how to organize information to achieve the most effective presentation.

Provide Professional Development

Developing an instructional plan for using authentic project-based learning is quite a different kind of planning for teachers. Principals can support teachers as they make these adjustments by providing professional development in planning and managing project-based learning. Typically, several workshops focusing on the topic are necessary; however, it is equally important to allocate time at staff meetings to share ideas and to discuss problems. Teachers are much more willing to try new approaches when they know they have administrative support even when they make mistakes. Continuing encouragement and an open atmosphere in which teachers can discuss the challenges they face will ultimately lead to success. (Table 3 provides an overview of some of the key issues to be addressed in planning an instructional format for project-based learning.)

Assessment of Projects

Assessment of student performance on projects is quite different from the assessment done for most courses. Students' knowledge of both academic and technical content must be assessed. A full range of assessment strategies can ensure students have acquired the necessary information and skills called for in the course goals and objectives.

What are the best strategies for assessing students' project work? Written tests are still important to assess certain types of factual knowledge, while demonstrations, presentations, reports, and portfolios may be better strategies to determine whether students have truly mastered critical concepts. Some of the most effective strategies for assessing projects are described below.

Table 3

Project Instruction Guidelines

- Make sure projects address one or more important course goals. Do not select a project simply because it is fun.
- Help students understand what represents quality work and expect them to check their own work to see if it meets the standards.
- Use videos, demonstrations, and work site visits to interest students and involve them emotionally in the project.
- Involve students in planning the project within the context of explicit parameters.
- Plan to teach content as needed to complete a project.
- Require students to work and learn cooperatively.
- Expect students to carry out some of their own research to complete the project.
- Devise strategies to help students stay on course throughout the project.
- Expect students to be able to explain how and why something works.
- Provide opportunities for students to present what they have learned to the class and to outside groups.

Portfolios

Portfolios are one of the most valuable tools in project-based courses. A portfolio is a collection of work that demonstrates a student's growing knowledge over time. Projects are only one of the ways they may be used. They help the teacher determine students' thinking processes throughout each project, the reasoning behind students' decisions, and students' ability to arrive at conclusions and communicate what they have learned. In general, students' portfolios should include their journal, a report about products they produced, and answers to key questions the teacher may ask them about their work.

Products

Requiring students to create a product is an excellent way to determine if they have mastered the correct processes and procedures. A product can be anything from a plan to a large machine. Regardless of what the product is, below are some common elements that should be assessed for each product:

• *Performance*

Does the product do what it is supposed to do?

What is the quality of craftsmanship?

Does the finished item meet quality standards identified for the product?

• *Economy*

Was it produced within the established budget?

Is the product visually pleasing?

Did the student use creativity in producing the product?

Is the product original?

Writing Assignments

Writing is such a critical life skill that it needs to be emphasized in every class. In project-based learning, students are expected to produce reports answering pre-determined questions. They also maintain journals, prepare a synopsis of their work, and submit interim written reports throughout the project.

Oral Presentations

Every project should culminate with an oral presentation. By the time students get to this point, they have had extensive experience making formal and informal presentations. While students are working on their projects, teachers can ask them questions periodically to both determine how they are progressing and to give students experience discussing their projects. The more students are expected to talk about their work and the knowledge and processes involved, the greater their understanding will be. Since many students will not be accustomed to making presentations, the teacher may want to invite a speech teacher to give students tips on making presentations.

The final project presentation is generally made before a panel of experts. Teachers may identify the members of this panel, but often, especially in the case of senior projects, teachers expect students to line up their own panels. This exercise in itself gives students another experience similar to what might be expected of them in a career.

Student Assessment

Since much project work is done in teams, one important way to measure student performance is to determine how well they function in teams. Teachers should develop a form that each team member can use to evaluate other members' performance, as well as their own. Some of the areas to be assessed might include: participating in the group; staying on topic; offering useful ideas; being considerate of others; making an effort to help the team reach consensus; and being able to communicate effectively.

To be effective, assessment criteria must be clear at the outset. Teachers who have used this process with students report that when students understand the criteria, they are fair and objective. More importantly, they begin to understand what constitutes quality work and how each person contributes to the good of the whole group.

Tests

Tests are an important assessment strategy in project-based instruction. They are especially valuable for testing students' knowledge of technical concepts and related academic knowledge. Tests should be designed to measure students' thinking and understanding. This requires teachers to develop tests that include essay questions and problems for students to solve. These types of questions test students' ability to explain in more depth the knowledge they have acquired and to use that knowledge to solve problems.

Grades

A clear explanation of how students will be assessed is a vital part of every project outline. First, teachers need to provide clear criteria regarding the quality of work that students must produce to achieve each grade on the scale. The assessment criteria should encourage students to accept responsibility for their own learning and participate as effective team members. For example, requirements for a student to earn an "A" in a course may include: does research, designs, and plans; needs little help from the teacher; applies academic skills; evaluates work and makes adjustments; produces quality product(s); seeks out and finds resources; learns from other students and contributes to other students' learning; demonstrates knowledge

Table 4: Sample Project Assessment Plan

Assessment Strategy	Description	Weight
Portfolio/Writing Assignments/ Oral Presentations/Student Assessment	Grades on portfolio, all writing assignments, oral presentations, the student's self-assessment, and assessment by other team members	1/3
Products	Grades on products	1/3
Tests	End-of-unit, end-of-project exams	1/3

with a grade of 90 or higher on tests; develops a quality portfolio; or makes an outstanding oral presentation.

The second part of the assessment plan provides students information on the weight that will be given to each assessment strategy. (A sample assessment plan is presented in Table 4.)

Conclusion

Project-based learning is only one of many strategies educators can use to connect the curriculum to real life, to make learning come alive. Planning and implementing effective projects is hard work, but with the principal's encouragement, teachers are energized to experiment with this instructional strategy. With the impact that project-based learning can have on student achievement, the whole school administration will be inspired to move to even higher levels of planning and execution of project-based learning. The rewards are many, but the best is the growth students experience in achievement and true understanding of important academic, technical, intellectual, and personal skills that are the key to their future success.

References

Cronin, J. F. "Four Misconceptions About Authentic Learning." *Educational Leadership* 7(1993): 78–80.

Jensen, E. *Teaching with the Brain in Mind.* Alexandria, Va.: Association for Supervision and Curriculum Development, 1998.

Kellough, R. D. *A Resource Guide for Teaching: K–12,* second edition. Upper Saddle River, N.J.: Merrill, 1997.

Maksimowiez, M. L. *Focus on Authentic Learning and Assessment in the Middle School.* East Lansing, Mich.: Michigan Association of Middle School Educators, 1993.

NASSP. *Breaking Ranks: Changing an American Institution.* Reston, Va.: NASSP, 1996.

Newmann, F. F., and Wehlage, G. G. "Five Standards of Authentic Instruction." *Educational Leadership* 7(1993): 7–10.

Schneider, D. "Social Studies Teaching: Citizenship Education and Authentic Learning." *The Clearing House* 67(1994): 132–33.

Valencia, S. W., and Peters, C. W. "You Can't Have Authentic Assessment Without Authentic Content." *The Reading Teacher* 44(1991): 590–91.

nassp

National Association of Secondary School Principals
1904 Association Drive, Reston, Virginia 20191-1537
(703) 860-0200 • (800) 253-7746 • Fax (703) 476-5432

BEST COPY AVAILABLE